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CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 8 March 2002 with an application for Letters Patent number 517723 made by Michael James Carter;Kevin Murray Ansley.

Dated 7 March 2003.

Neville Harris
Commissioner of Patents

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James & Wells ref: 19344/32 TL

PATENTS ACT 1953
PROVISIONAL SPECIFICATION

FOLDABLE CRAFT

I/WE, Michael James Carter a New Zealand citizen of 238 Waimaori Road, RD 2, Raglan, New Zealand and
Kevin Murray Ansley a New Zealand citizen of 31 Main Road, Raglan, New Zealand

do hereby declare this invention to be described in the following statement:

FOLDABLE CRAFT

TECHNICAL FIELD

The present invention relates generally to foldable watercraft and in particular, to craft capable of transporting standard shipping containers and being folded into the dimensions of same.

BACKGROUND ART

Shipping containers are the predominant form of transporting containerized goods or produce throughout the world, particularly by sea. The international standardization of shipping container dimensions permits the use of automated container handling systems and the compatibility of different transportation means to move a given container via air, land or sea.

The majority of cargo handling equipment is specifically configured to handle containers of internationally agreed dimensions such as those specified in the Australian and New Zealand Shipping container standards AS/NZS 3711.1;1993, the International (ISO 1496) or British (BS 3951) standards. The dimensional tolerances permitted under such standards are extremely small (between 5-10mm maximum). This enables the use of standardized lifting and securement fittings to be accurately placed at defined positions about the container periphery. Such standardized container handling fittings permit individual containers to be secured to each other and/or to the deck of a ship, truck, or plane by correspondingly dimensioned standard container handling means.

A common feature in the construction of these containers is specially designed corner castings. These can be used in conjunction with fittings known as 'twist locks' (as defined by the ISO 1161/BS 3951 standard) fitted on the vehicle, vessel, or lifting

apparatus to provide a simple and positive means of restraint. Provided that the twist locks are fully engaged and locked in position, the container will be adequately secured and no further restraint is required.

In many large modern container ports, automated systems daily handle huge volumes of containers with minimal human interaction. However, there are many locations unsuited or ill equipped to receive large container ships bearing multiple containers. Such locations may include costal areas/ lakes/rivers/tributaries/estuaries/islands and any other area without a suitable harbor.

It may be necessary to move individual containers between such locations and a container vessel at a deep water anchorage, necessitating some type of intermediate transport craft capable of transporting a shipping container between the shore and the larger vessel or vice versa. In some instances, it would be advantageous for a large container vessel itself to carry such an intermediate transport craft enabling a loading/unloading capability independent of large harbour facilities.

Clearly, such a craft would require the structural integrity and load carrying capacity necessary to accommodate a standard shipping container and its load; (which may be up to approximately 24 tonnes including the weight of a 3 tonne 6 meter container) in a secure and seaworthy manner. Such requirements would typically require a craft of a significant size and strength. Consequently, storage of such a craft may be problematic on a vessel configured to store objects the size of shipping containers.. Further storage difficulties may arise from the irregular shape of such a landing craft/barge.

In many regions of the pacific, small islands may be ringed by reefs, be bereft of all-weather safe harbour facilities and be exposed to potentially adverse weather system and resulting large seas. The remote Pacific Norfolk Islands for example, currently receive ship born supplies from container ships which are often obliged to await favorable weather for days to permit the transfer of palletized goods over the side of

the vessel into lighters, (a large boat, barge or dinghy-type craft; - mainly used in unloading or loading vessels which can not reach the wharves at the place of shipment or delivery). Due to the lack of all weather harbour facilities ashore, the dingy craft needs to be lifted from the water after use to prevent potential damage. Maritime insurance costs are particularly high for goods transferred from ship to shore in such a manner due to the increased spillage or water spoilage risks.

Clearly, such a supply environment would benefit from being able to transport sealed containers directly into a seaworthy vessel located on the container ship and them transferring the combined craft and container into the water for transfer to the shore. Also, the ability to lift the craft from the water and thereafter be transported overland to alternative locations would be of clear benefit.

Military forces of various nations are often posed with the need to transfer manpower, materials and equipment to remote locations by sea. Inevitably, this may pose the difficulty of transferring such materials ashore on potentially awkward coastlines. Even beaches can cause difficulties as typical military landing craft still draw over a meter when they beach. Thus, there is often no practical means of removing containers or pallets from the craft until the tide recedes. Even then, specialized rubber matting is needed for the motorized transport to access the landing crafts. It would therefore be advantageous if crafts used for such activities were configured with a reduced draught whilst maintaining their seaworthiness.

There is therefore a need for a watercraft capable of transporting a standard shipping container, capable of being easily handled by standard shipping containers handling means when being deployed and/or stored. Ideally, said craft itself should be capable of being folded into the dimensions of a standard shipping container.

All references cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the

references states what their authors assert, and the applicants reserve the right to challenge the accuracy and pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents form part of the common general knowledge in the art, in New Zealand or in any other country.

It is an object of the present invention to address the foregoing problems or at least to provide the public with a useful choice.

Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

DISCLOSURE OF INVENTION

According to one aspect of the present invention there is provided a water craft capable of carrying a shipping container, said craft being collapsible into a volume not greater than that of a standard shipping container.

Preferably, said craft is collapsible into a volume substantially coterminous with the exterior dimensions and configuration of a shipping container.

Thus, by providing a water craft with the capability to be collapsed into the dimensions of a standard shipping container, the whole collapsed craft may be moved as a unit using standard shipping container handling systems. Furthermore, the craft obviates the need for specialized custom storage positions and fittings for the erected craft and may instead be readily stored in any conventional position suitable for other shipping containers, including under or on top of other containers.

According to another aspect of the present invention there is provided a craft substantially as described above wherein said craft is formed from a plurality of releasibly secureable sections movable with respect to each other enabling the

reversible configuration of the craft in an erected configuration for use as a water craft and a collapsed configuration for storage and/or transport.

As used herein, the term 'shipping container' refers to a substantially cuboid container dimensioned in accordance with any recognised national or international format or ISO standard for shipping containers.

It will be understood that all references to the orientation of the craft are made with respect to the craft deployed for use in the water and do not imply any restraint or restriction on the orientation of the container in its collapsed configuration during transport and/or storage.

According to one embodiment, said sections are pivotally and/or slidably attached to at least one adjacent section.

In an alternative embodiment, said sections are detachable from each other.

Preferably, said craft is provided with standard shipping container lifting and attachment fittings.

Preferably, the base section includes standard lifting and attachment fittings on an upper surface.

Preferably, at least some said lifting and/or attachment fittings are placed in locations on the craft such that in the collapsed configuration, the position of the fittings correspond to the positions of comparable fittings on known shipping containers.

According to a further aspect of the present invention there is provided a craft substantially as described above wherein said sections includes a substantially rectangular base section with port and starboard longitudinal sides, said base section having a length and width corresponding to those of a shipping container, and a lower surface forming a bottom hull surface of the craft when configured in said erected

configuration for aquatic use.

Preferably, said craft also includes port and starboard centre sections, locatable alongside the respective port and starboard sides of the base section.

Preferably, said craft further includes port and starboard bow sections and port and starboard stern sections, locatable fore and aft of the port and starboard centre sections respectively.

In one embodiment, said port and starboard centre sections are both moveable between the said erected and said collapsed configurations by pivoting and/or sliding from a position laterally outboard from said centre section to a position on top of said base section respectively.

Preferably, said port and starboard centre sections are pivotable through approximately 90° about said port and starboard longitudinal base sides, preferably in conjunction with the respective port and starboard bow and port and starboard stern sections

In an alternative embodiment, said port and starboard centre sections are both moveable between the said erected and said collapsed configuration by detaching and relocating from a position laterally outboard from said centre section to a position on top of the ports and starboard sides of said base section respectively.

According to a further aspect of the present invention, said port and starboard bow and port and starboard stern sections are moveable between the said erected and said collapsed configuration after the movement of the port and starboard centre sections on top of the base section by pivoting and/or sliding from positions fore and aft of the port and starboard centre sections respectively, to a position on top of said port and starboard centre sections respectively.

Preferably, said port and starboard bow and port and starboard stern sections are

substantially pivotable through approximately 90° about lateral axes respectively located at the fore and aft ends of the port and starboard centre sections perpendicular to the longitudinal sides of the base section.

In an alternative embodiment, said port and starboard bow and port and starboard stern sections are moveable between the said erected and said collapsed configuration by detaching and relocating from positions fore and aft of the port and starboard centre sections respectively, to a position on top of said port and starboard centre sections respectively.

According to a further aspect of the present invention, said craft further includes a bow and stern centre section, respectively located fore and aft of the base section.

Preferably, said bow and stern centre sections are moveable between the said erected and said collapsed configuration by pivoting and/or sliding from positions fore and aft of the base section to positions on top of the fore and aft ends of the base section.

Preferably, said bow and stern centre sections are substantially pivotable and/or slidable through approximately 180° about lateral axes respectively located at the fore and aft ends of the base section perpendicular to the longitudinal sides of the base respectively.

In an alternative embodiment, said bow and stern centre sections are moveable between the said erected and said collapsed configuration by detaching and relocating from positions fore and aft of the base section to positions on top of the fore and aft ends of the base section.

According to one aspect of the present invention, when in the collapsed configuration, the outward surface of the sections from a substantially regular cuboid corresponding in dimension to a shipping container.

Whilst the above described reversible configuration of the craft in an erected configuration and a collapsed configuration may be one of several possible configurations, it has been found to be particularly expedient in terms of practicality of erecting/collapsing, volumetric efficiency in the collapsed configuration and providing a sea-worthy, strong yet light craft.

In order to ensure the craft may be collapsed into the strict dimensions of a shipping container and yet retain the requisite strength to carry a fully loaded container when erected, a precise interrelation is required between the dimensions/proportions of the constituent sections forming the craft,

Preferably, each section is releasably securable to at least one adjacent section in both the collapsed and erected configurations to form a rigid structure.

According to a yet further aspect of the present invention, the maximum length, width and height of the sections, as measured in the erected configuration are formed in accordance with one or more of the following criteria:

- the height of the port or starboard bow section is equal to the height of the port or starboard stern section;

- the length of the port or starboard bow section equals the port or starboard stern section;

- the height of the port or starboard centre section plus the port or starboard bow section plus the base section equals the height of a shipping container;

- the height of the port or starboard centre section plus the port or starboard stern section plus the base section equals the height of a shipping container;

- the length of the bow or stern section plus the height of the base section equals height of ship container;

- the height of the bow and stern section plus the length of the port or starboard centre section equals length of shipping;

- the length of bow section equals stern section;

- the length of the port or starboard bow section plus the length of the port or bow stern section is approximately equal to the length of the port or starboard centre sections;

- the width of the port or starboard bow section plus the width of the port or starboard centre sections plus the height of the base section equals the height of a shipping container;

- the height of the port or starboard bow section plus the width of the port or starboard centre section plus the height of the base section equals the height of a shipping container;

- the width of the port or starboard bow section plus the height of the port or starboard centre section plus the height of the base section equals the height of a shipping container;

- the height of the port or starboard bow section plus the height of the port or starboard centre section plus the height of the base section equals the height of a shipping container

- the height of the stern section plus the height of the bow section plus the length of the port or starboard stern section plus the length of the port or starboard bow section equals the length of a shipping container;

- the height of the stern section plus the height of the bow section plus the length of port/starboard center section equals the length of a shipping container;

Preferably, the ratio of length of the stern section, the bow section, the port or starboard centre sections, the port or starboard bow section, and the port or starboard stern sections with respect to the length of the base section are 3:1, 3:1, 1.25:1, 2.5:1, 2.5:1 respectively.

Preferably, the ratio of heights of the stern section, the bow section, the port or starboard centre sections, the port or starboard bow section, and the port or starboard stern sections with respect to the height of the base section are 1:1, 1:1, 0.5:1, 0.5:1, 0.5:1 respectively.

Preferably, the ratio of width of the stern section, the bow section, the port or starboard centre sections, the port or starboard bow section, and the port or starboard stern sections with respect to the width of the base section are 1:1, 1:1, 2.4:1, 2.4:1, 2.4:1, respectively.

BRIEF DESCRIPTION OF DRAWINGS

Further aspects of the present invention will become apparent from the following description which is given by way of example only and with reference to the accompanying drawings in which:

Figure 1 shows a preferred embodiment of the present invention of a collapsible water craft, showing the craft in the erected configuration in plan view from above;

Figure 2 shows a frontal elevation of the craft shown in figure 1;

Figure 3 shows a side elevation of the craft shown in figure 1;

Figure 4 shows a front elevation of the craft shown in figure 2 in a partially collapsed configuration;

Figure 5 shows a front elevation of the craft shown in figure 2 in a partially collapsed configuration;

Figure 6 shows a side elevation of the craft shown in figure 1 in a partially collapsed configuration;

Figure 7 shows a side elevation of the craft shown in figure 1 in a partially collapsed configuration;

Figure 8 shows a front elevation of the craft shown in figure 1 in a partially collapsed configuration;

Figure 9 shows the craft shown in figure 1 in a collapsed configuration;

Figure 10 shows a hinged configuration in accordance with a preferred embodiment of the present invention;

Figure 11 shows a magnified view of the hinged configuration shown in figure 10;

Figure 12(a) shows a further magnified plan view of the hinge configuration shown in figures 10-11; and,

Figure 12(b) shows a side elevation of the hinge configuration shown in figures 12(a).

BEST MODES FOR CARRYING OUT THE INVENTION

The figures 1-11 show a preferred embodiment of the present invention in the form of a collapsible water craft (1) capable of transporting a standard shipping container (not shown) when said craft (1) is deployed in its erected configuration (as shown in figures 1 to 3) and which may be reversibly reconfigured into a collapsed configuration as shown in figure 9. Figures 4-8 illustrate various stages in the collapsing process.

Figure 1 shows a plan view of the craft (1) formed from a plurality of sections: a base section (2), port and starboard centre sections (3, 4), port and starboard bow sections (5, 6), port and starboard stern sections (7, 8), a bow section (9) and a section stern (10). In the erected configuration shown in figures 1 to 3, the sections (1-10) are fixed together to form a single rigid craft. Said fixing means (not shown) may be achieved by any convenient means such as pins, bolts, latches and so forth.

In greater detail, the base section (2) is formed as a substantially rectangular (in plan view) base with a length and width substantially corresponding to that of a standard shipping container. The base section (2) has a smooth planar lower surface which forms the bottom hull surface of the craft (11) and a port and starboard longitudinal edge (12, 13) and a bow and stern transverse edge (14, 15) extending laterally across the width of the base section (2). The upper surface (16) of the base section (2) provides the cargo deck of the craft (1) and is dimensioned lengthwise and widthwise to correspond with the length and width of a standard shipping container.

The deck (16) is also provided with a plurality securement points for affixing cargo to the deck. A variety of such fitments (17) may be used such as twist locks or (as shown in figures 1, 2, 10 and 11) are fitted at the locations substantially corresponding to the apices of a container footprint for securing thereto. Although a variety of cargo may be secured to the deck surface (16), standard shipping containers are easily guided into the correct position for securing by inwardly slopping ramps on top of the lift lugs (17). These cause the container to be centralised as it is being lowered onto the deck surface (16) for engagement with the appropriate fittings.

The port and starboard centre sections (3, 4) are located adjacent the port and starboard edges (12, 13) respectively of the base bracket (2). In the embodiment shown in the drawings, all the sections, including the port and starboard centre sections (3, 4) are pivotably attached to at least one adjacent section enabling the craft (1) to be collapsed

into its folded configuration. Figure 1 shows four hinge mechanisms (18) located along each of the port and starboard sides of the base (2) as described in the more detail below with reference to figures 10 and 11.

The craft (1) is also provided with port and starboard bow sections (5, 6) and port and starboard stern sections (7, 8) pivotably attached fore and aft of the port and starboard centre sections (3, 4) respectively. All the said port and starboard bow sections (5, 6), centre sections (3, 4) and stern sections (7, 8) are pivotably attached fore and aft of the port and starboard centre sections (3, 4) respectively. The remaining sections of the craft (1) i.e. the bow and the stern sections (9, 10) are pivotably attached fore and aft of the base section (2) respectively interposed between the port and starboard bow sections (5, 6) and the port and starboard stern sections (7, 8).

The bow section (9) and the stern section (10) also function as loading ramps when the craft is in contact with the land. Double-ended link hinges mechanisms (18) attach both the bow and stern section to the base section (2). When intended for aquatic use and/or for transporting cargo, the craft (1) is configured in its erected form as shown in figures 1 to 3 and wherein all the sections (1-10) are securely fastened to each other. After use, when the craft has been unloaded and is required to be stored and/or transported, the sections (1-10) may be collapsed as follows:

- the port and starboard bow, centre, and stern sections (5, 6, 3, 4, 7, 8) are lifted together and pivoted inboard (about an axis parallel to said port and starboard edges (14, 15)) through approximately 90° (as shown in figure 4) until they are orientated perpendicular to their starting position with the lower surface of the sections now being aligned with the port and starboard sides (respectively) of the base section (2). Figure 5 shows the completion of this stage. During this movement, the port and starboard bow and stern sections (5, 6, 7, 8) are moved in conjunction with the port and starboard centre sections (3, 4) respectively.

- After the port and starboard sections have been placed on top of the base section (2), the port and starboard bow and stern sections (5,6,7,8) are pivoted about hinges (19) attached at the upper edge (with respect to its orientation at this stage) of their mutual faces. This pivoting moves the port and starboard bow and stern sections (5,6,7,8) from the initial position shown in figure 6 through the intermediate stage (shown in broken outline in figure 7) until reaching the final position (shown in solid line in figure 7).

- The port and starboard bow sections (5, 6) are then pivoted towards the stern whilst the port and starboard stern sections (7, 8) pivoted in the reciprocal direction towards the bow until all four sections come to rest on top of the port and starboard centre sections (3, 4) respectively. The combined heights of the sections (in their new orientation) stacked on top of each other correspond to the height of a standard shipping container.

- Finally, the bow and stern sections (9, 10) are folded upwards and inwards towards the stern and bow respectively until positioned on top of the bow and stern edges (14, 15) of the base section (2) respectively. The height of the bow and stern sections (9, 10) (corresponding to their length in the erected configuration) in conjunction with the height of the base section (2) are equal to the height of a standard shipping container.

The folded sections now form a substantially cuboid volume with the exterior dimensions corresponding to that of a standard shipping container and without any significant voids or projections from the dimensions of same. The sections of the craft (1) may be secured together as required to ensure the entire collapsed craft (1) may be moved as a single entity without inadvertent unfolding. Such releasable securement may be provided by pins, latches and the like (not shown). At the corner of the cuboid formed by the collapsed craft, twist lock fittings (20) are provided to enable standard

shipping container handling facilities to move the craft as per standard shipping container. The process for unfolding a craft (1) to form the erected water craft (1) is simply a reversal of the process described above.

Figure 10 shows the hinge mechanism arrangement between the base (2) and the port center section (3). However, comparable hinging arrangements are present between the base section (2) and the starboard centre section (4), bow section (9) and stern section (10). The sides of all four of these sections (3, 4, 9, 10), including the port centre section (3) shown in figure 10 are located substantially flush against the sides a of the base section (2) in the erected configuration. Thus, movement into their position in the collapsed configuration on top of the base section (2) is not possible with a simple fixed pivot/hinge arrangement without interference between the sections.

The hinging mechanism (18) shown in detail in figures 10, 11 and 12(a-b) is required to permit the section (3, 4, 9, 10) adjacent the base section (2) to move vertically upwards whilst pivoting inwards towards the center of the base section (2). To achieve this pivoting and sliding/translational movement, the hinge mechanism (18) is located in a slot (22) in the outer edge of the upper surface (16). The hinge mechanism (18) itself is composed of a pair of elongated rectangular linkages (23), pivotally attached at either end via pins (21) to the center sections (2) and outboard sections (3, 4, 9, 10) respectively. In both the erected and collapsed configuration, the linkages (23) lie inside the slot (22) flush with the upper surface (16) of the center section (2).

It will be appreciated that although hinging the component sections together provides an efficient and practical means of erecting and collapsing the craft, alternative methods may be employed to achieve same. In one embodiment, some or all of the sections (1-10) may be detached from their adjacent section to be moved into the collapsed configuration and then reattached in a secure manner. In this method, hinges, pivots or the like are not necessarily required. However, this causes an

additional burden in terms of the facilities necessary (manpower, cranes and so forth) for manipulation of the sections.

It will be appreciated that variations in the arrangement of the sections in the collapsed configuration are possible, for both a hinged and a detachable means of moving the sections. As an example, the above-described collapsing of the craft (1) in which the sections are hinged together, the port and starboard centre sections (3, 4), bow sections (5, 6) and stern sections (7 ,8) are all pivoted from their erected orientation through approximately 90° in the collapsed configuration. However, any or all of the these section could have been moved (either by hinged linkages or by detaching moving and re-attaching) vertically and laterally into the collapsed configuration without pivoting. Naturally, this would require appropriate alteration of the widths and heights of the various sections.

In order to provide the structural integrity necessary to support a fully loaded shipping container which may weigh up to 24 tonnes requires the sections (2-10) to be of a minimum size, (in particular in cross section) to provide the necessary panel strength. It has been found to this end, that a craft (1) with an overall length of 10(16)* metres with a beam of 4.5 metres and a height of 1.2 metres in its erected configuration which may be collapsed to measure an overall length of 6(12)* metres with a width of 2.5 metres may be utilized to carry 6 metre containers (or 12 metre containers, as denoted by the *) on board the craft (1) whilst being capable of subsequently folded into the dimensions of same.

To form a seaworthy craft capable of transporting such a shipping container, the extremely tight fit (with a tolerance of +/- 2%) between the above described sections (2-10) reduces possible alternative folding configurations. To successfully fit within the dimensions of such a shipping container, it has been found that the sections must comply with certain relative proportions of the length, width and height of each section

as defined below with respect to the width of a shipping container. The width of a container is used as the common denominator in these ratios as the length and height of shipping containers standards vary. These variations may be easily accommodated by appropriate scaling of the section lengths/heights.

Table 1. Ratios of section lengths, widths and heights with respect to a container width.

Sections	Length	Width	Height
base (2)	0.4:1	1:1	4:1
port centre (3)	0.5:1	2.4:1	2:1
starboard centre (4)	0.5:1	2.4:1	2:1
port bow (5)	1:1	2.4:1	2:1
starboard bow (6)	1:1	2.4:1	2:1
port stern (7)	1:1	2.4:1	2:1
starboard stern (8)	1:1	2.4:1	2:1
bow (9)	1.2:1	1:1	4:1
stern (10)	1.2:1	1:1	4:1

It will be appreciated by those skilled in the art that alternative means of collapsing the erected craft into the dimensions of a shipping container may be employed, including variations in hinging configurations, collapsing sequence, orientation of the sections in their collapsed configuration, and their dimensions and as such, said variations fall within the scope of the invention.

Aspects of the present invention have been described by way of example only and it should be appreciated that modifications and additions may be made thereto without departing from the scope thereof.

MICHAEL JAMES CARTER &

KEVIN MURRAY ANSLEY

By their Attorneys

JAMES & WELLS

per: 

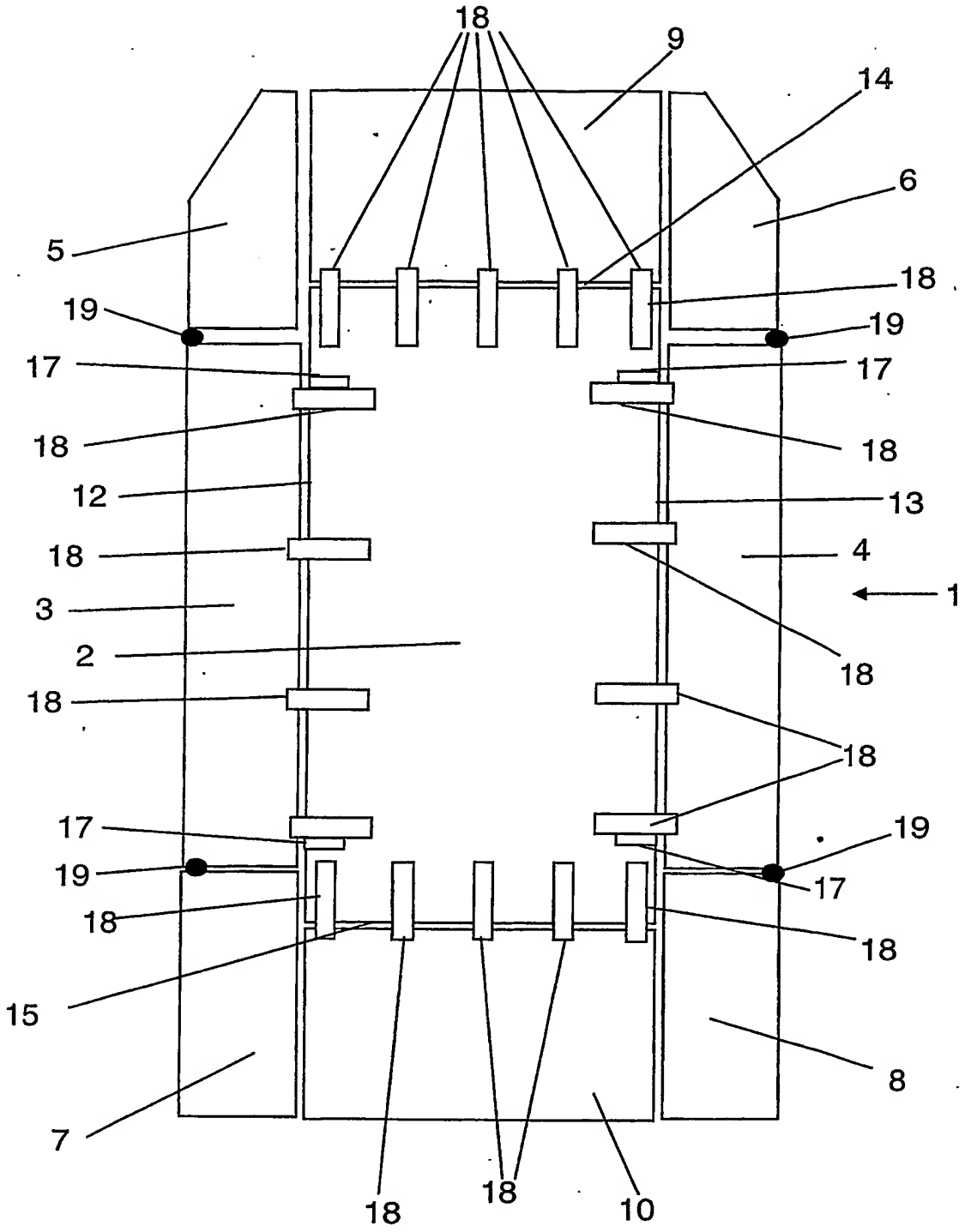
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FIGURE 1

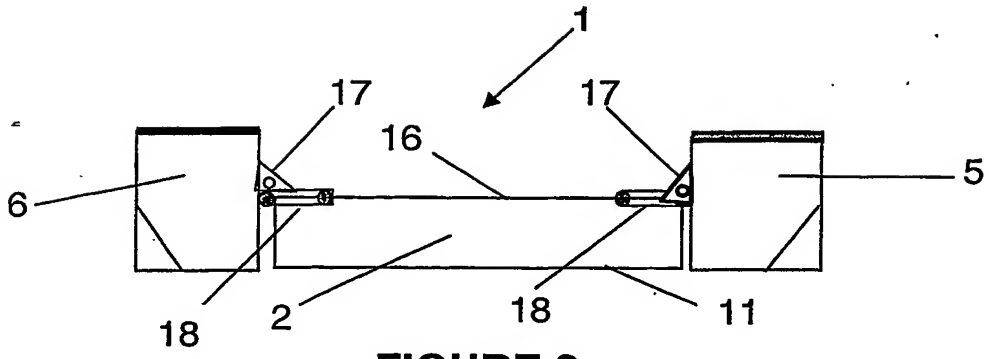


FIGURE 2

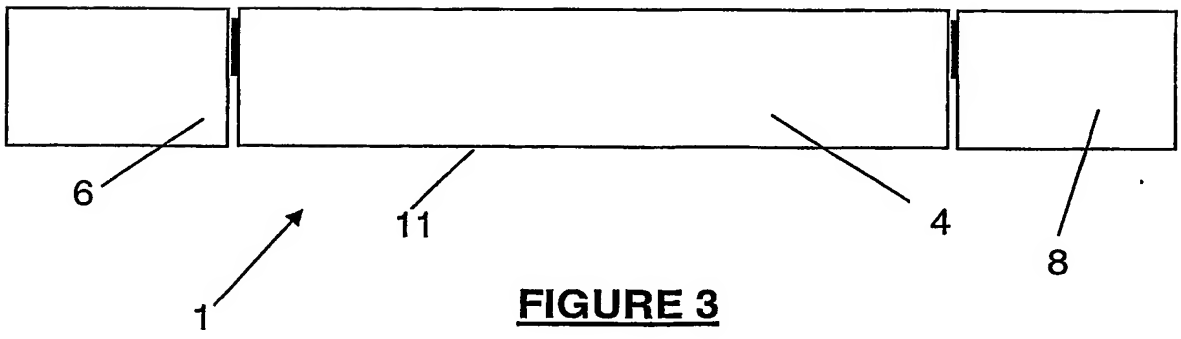


FIGURE 3

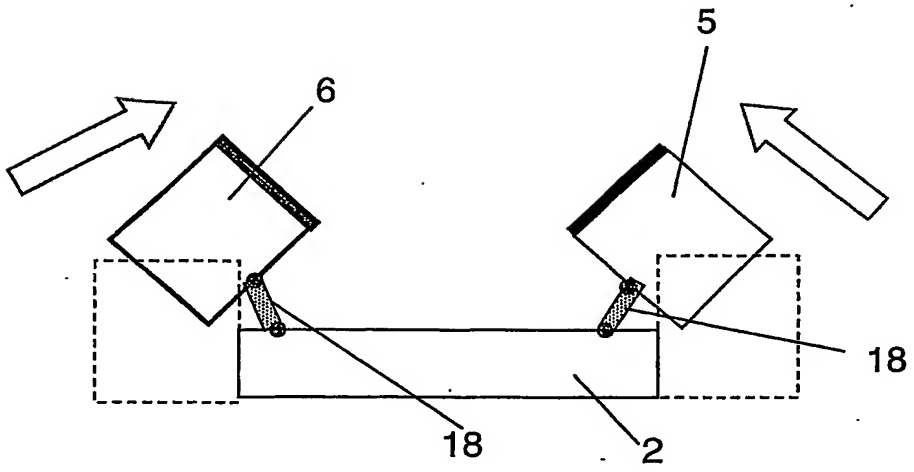


FIGURE 4

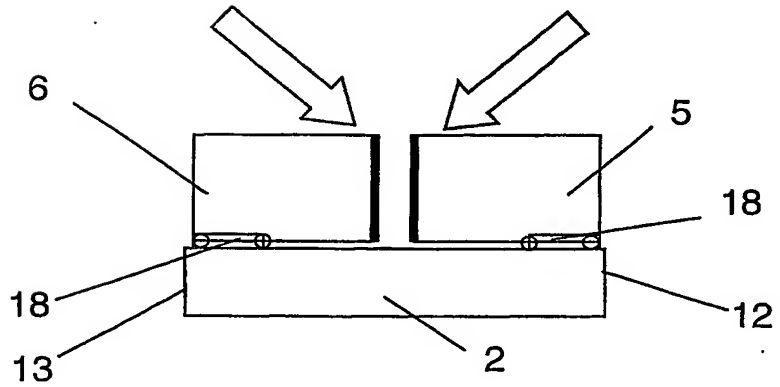


FIGURE 5

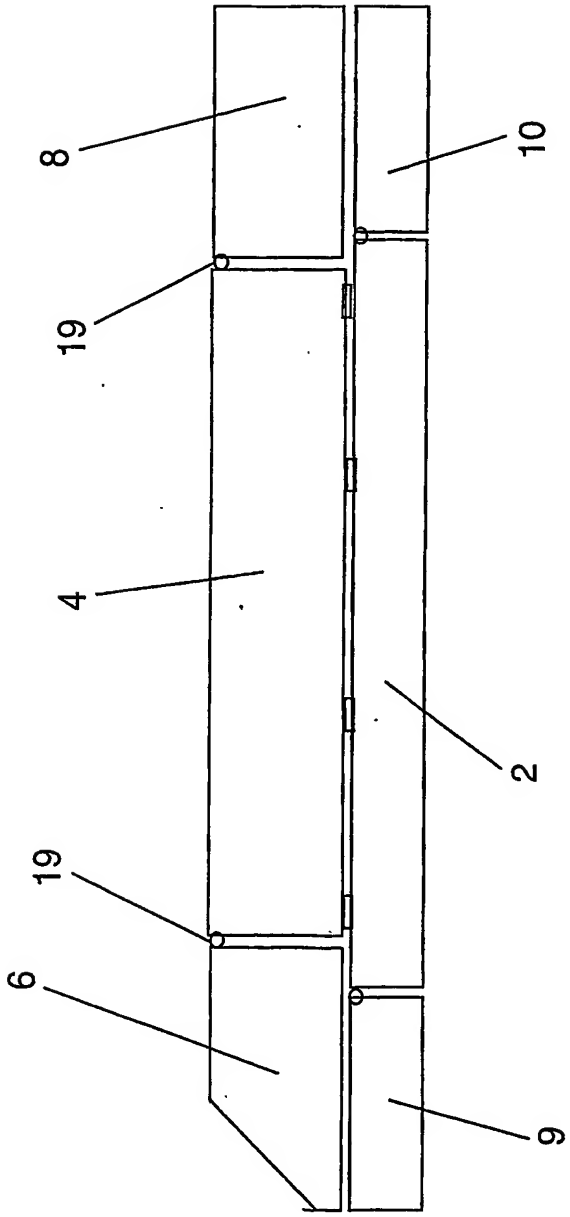


FIGURE 6

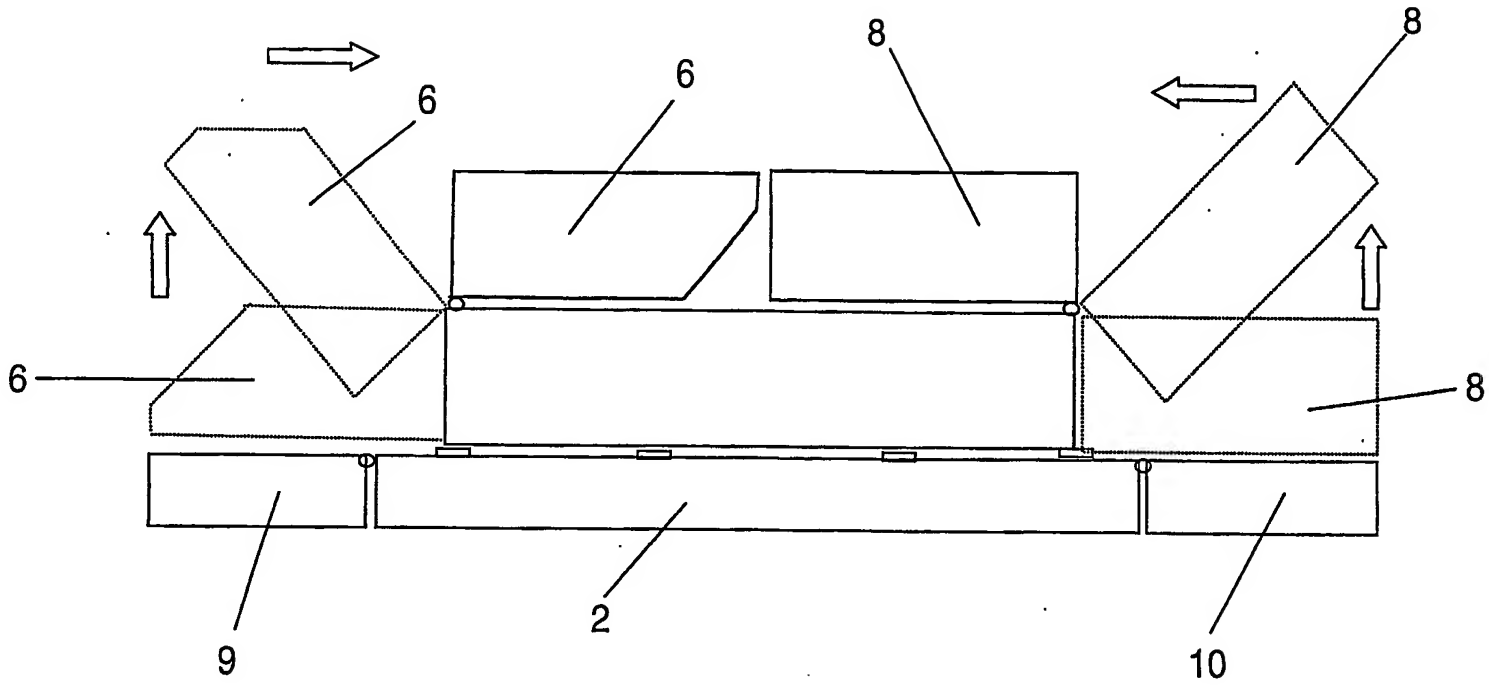


FIGURE 7

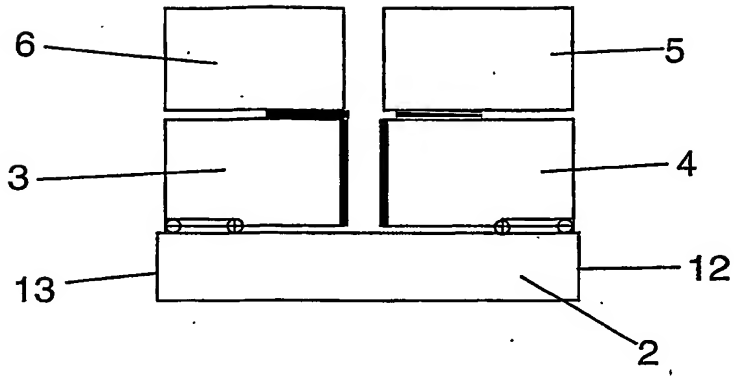


FIGURE 8

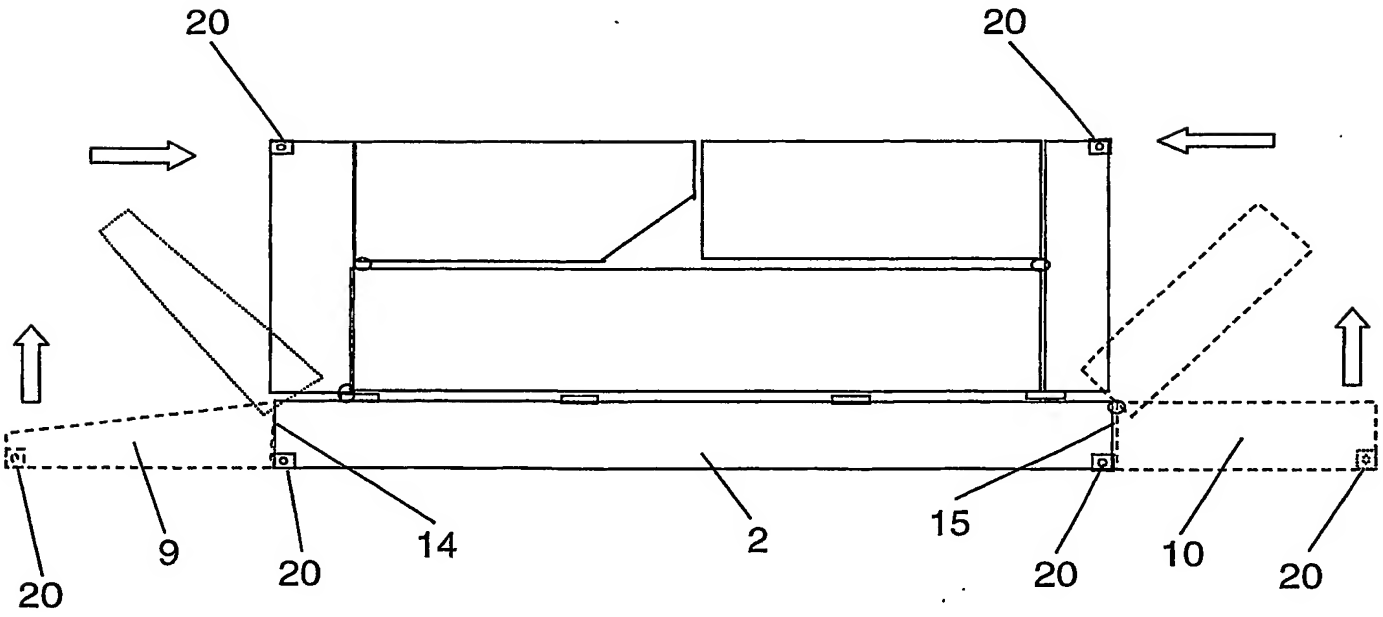


FIGURE 9

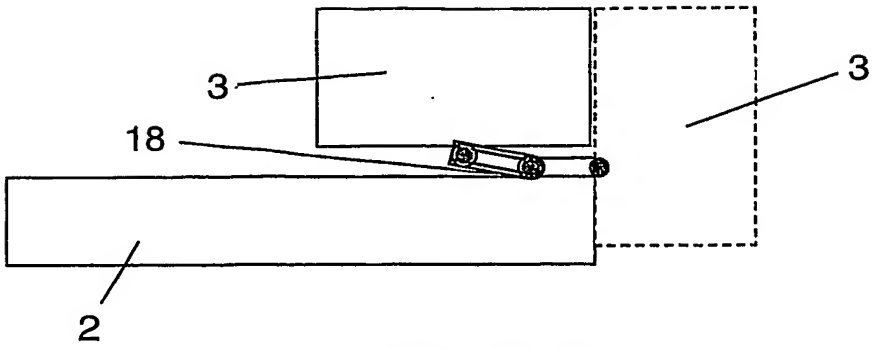


FIGURE 10

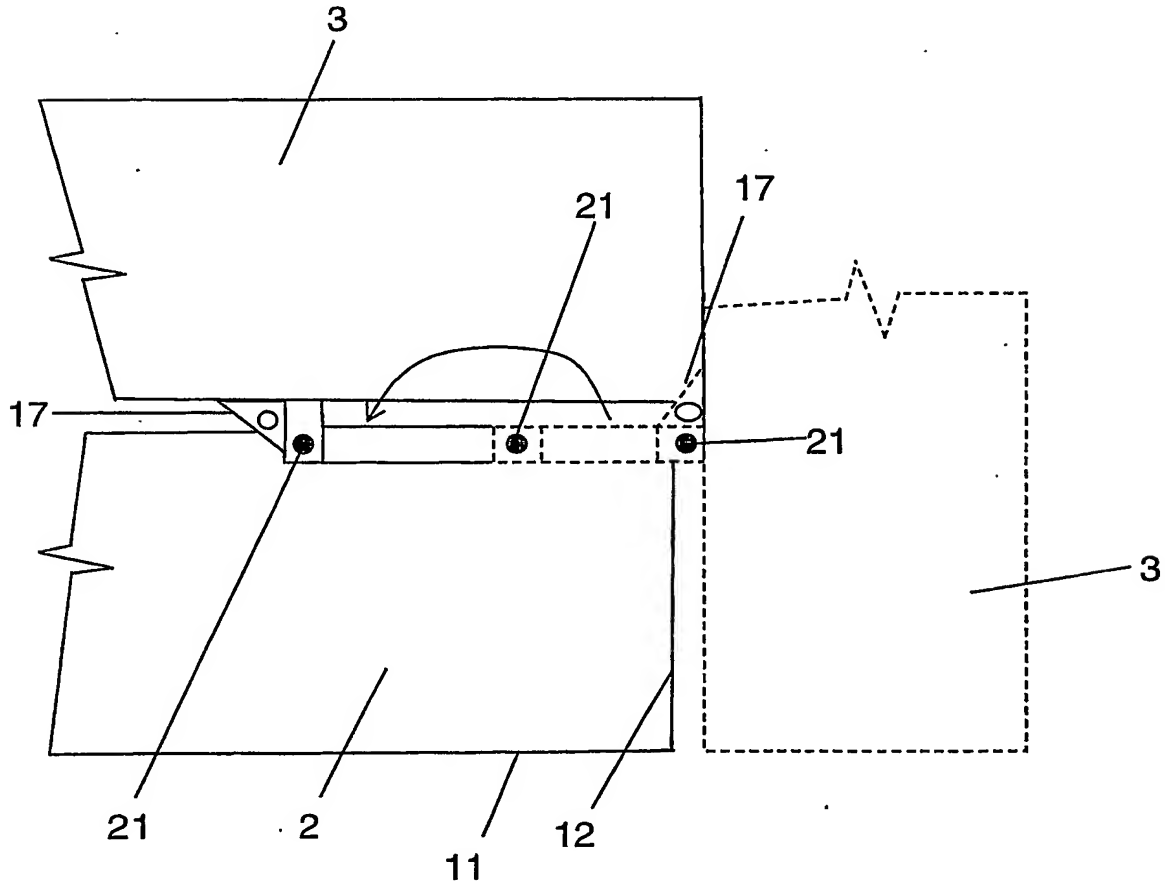
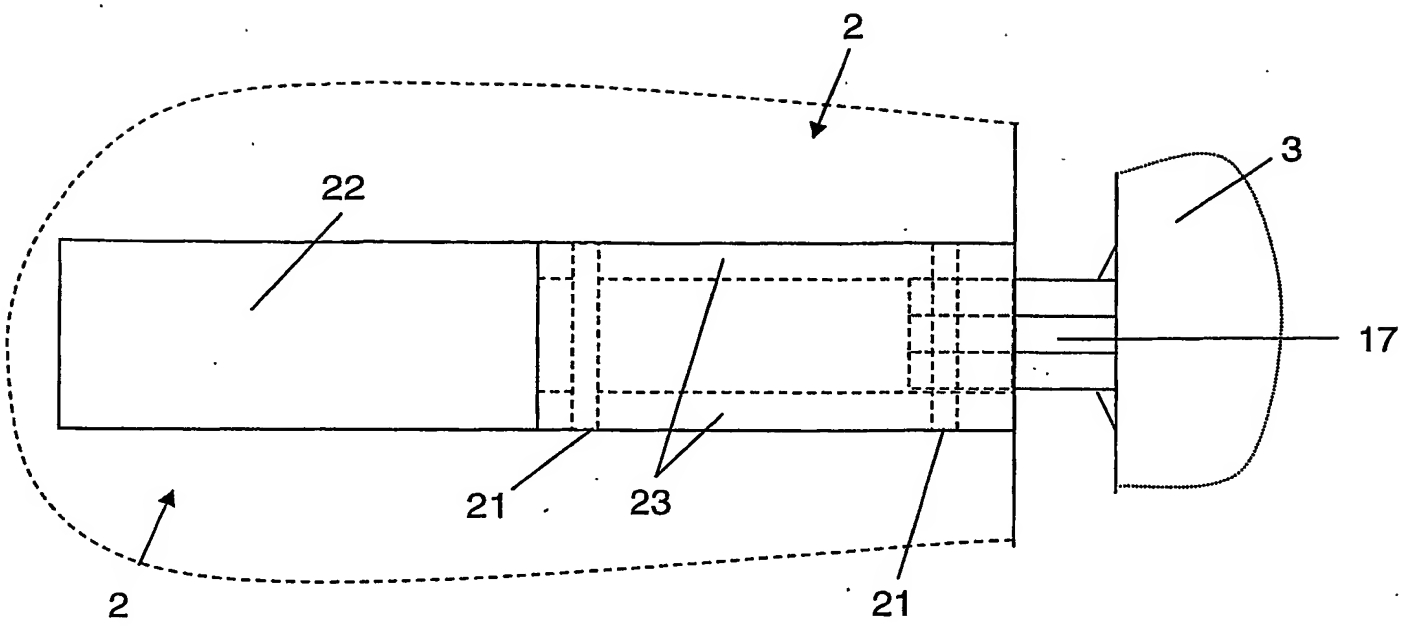
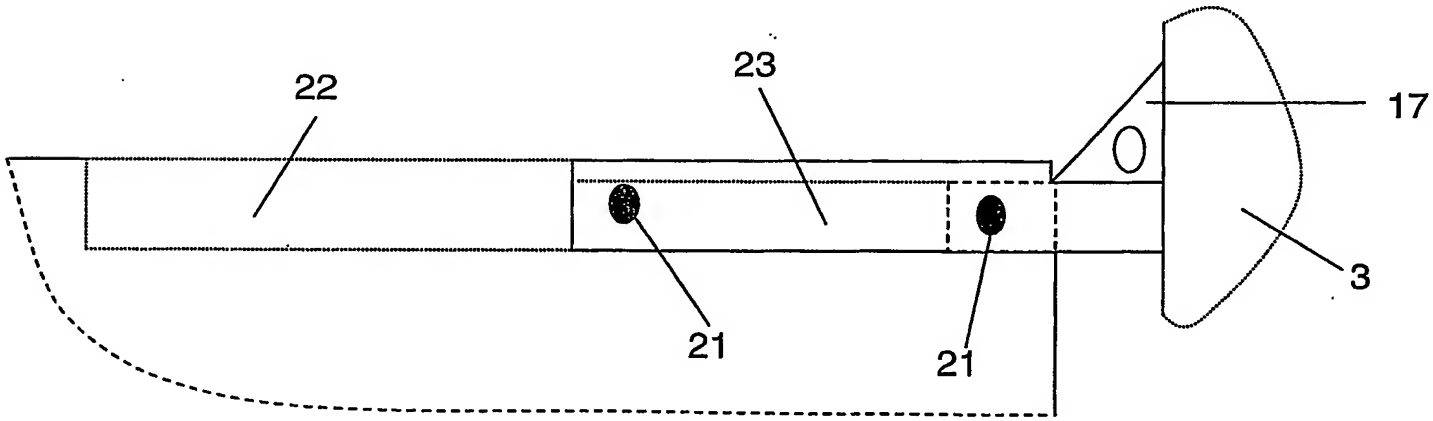


FIGURE 11



(a)



(b)

FIGURE 12